

MULTIMEDIA



UNIVERSITY

STUDENT IDENTIFICATION NO

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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2017/2018

BDS2074 – MANAGEMENT DECISION SCIENCE

(All sections/Groups)

14 MARCH 2018
2.30 p.m. – 4.30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 5 pages excluding the cover page.
2. There are **FOUR** questions in total. Answer **ALL** the questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please use pen to answer all your questions in the Answer Booklet provided.

QUESTION 1

Choco Nut Inc., has 500 pounds of peanuts, 100 pounds of pecans and 50 pounds of cashews on hand. They package three types of 5-pound cans of nuts: Can A contains 3 pounds of peanuts, 1 pound of pecans and 1 pound of cashews, Can B contains 4 pounds of peanuts, $\frac{1}{2}$ pound of pecans and $\frac{1}{2}$ pound of cashews; and Can C contains 5 pounds of peanuts. The selling price is \$28 for Can A, \$24 for Can B, and \$20 for Can C.

- Formulate the above managerial statement as a Linear Programming problem. [5 marks]
- Set up the initial simplex tableau by including the necessary slack variables. [6 marks]
- Determine the second simplex tableau by using the simplex method. [8 marks]

Given the following **Final Tableau**:

C_j		28	24	20	0	0	0	
	Solution Mix	X_1	X_2	X_3	Slack 1	Slack 2	Slack 3	Quantity
20	X_3	0	0.5	1	0.2	0	-0.6	70
0	S_2	0	0	0	0	1	-1	50
28	X_1	1	0.5	0	0	0	1	50
	Z_j	28	24	20	4	0	16	2800
	$C_j - Z_j$	0	0	0	-4	0	-16	

S_1 – slack for peanuts constraint
 S_2 – slack for pecans constraint
 S_3 – slack for cashews constraint

- Determine the optimal number of cans of each kind that should be made and the maximum revenue. [3 marks]
- Determine the dual price of peanuts available and discuss the effect of increasing the peanut on total revenue. [3 marks]

[Total: 25 Marks]

Continued...

QUESTION 2

Fairbank Incorporated, is planning to install a new computerized customer relationship management system. The management has determined the activities required to complete the project, the precedence relationships of the activities, and activity time estimates as shown in the following table:

Activity	Immediate Predecessors	Time Estimates (days)		
		Optimistic	Most Likely	Pessimistic
A	-	5	8	17
B	-	3	12	15
C	A	4	7	10
D	A	5	8	23
E	B, C	1	1	1
F	B, C	1	4	13
G	D, E	3	6	9
H	D, E	1	3	7
I	H	1	1	1
J	F, G	2	2	2
K	G, I	5	8	11

- Draw a network diagram that illustrates the above project. [6 marks]
- Determine the expected duration and the variance of each activity. [5 marks]
- Find the critical path and hence determine the expected completion time and the variance for this project. [8 marks]
- What is the probability that the project will be completed in 40 weeks or less? [6 marks]

[Total: 25 Marks]

Continued....

QUESTION 3

- a. Three steel plants in Banting, Skudai, and Kertih, produce and supply steel to four different projects, namely, A, B, C, and D. The weekly production, demand and shipping costs per ton of steel are as follows:

From	To				Production(tons)
	A	B	C	D	
Banting	\$14	9	16	18	150
Skudai	11	8	7	16	210
Kertih	16	12	10	22	320
Demand(tons)	130	130	180	240	

Determine the initial solution using the Northwest Corner method and then obtain the optimal production schedule by using the Stepping Stone method.

[15 marks]

- b. BGW Sdn. Bhd, a manufacturing company, has four machines, A, B, C, and D that has to be operated by four operators. Given the following cost details, determine the optimal assignment schedule and compute the total minimum cost.

Operator	Machine			
	A	B	C	D
1	\$10	2	8	6
2	9	5	11	9
3	12	7	14	14
4	3	1	4	2

[10 marks]

[Total 25 Marks]

Continued....

QUESTION 4

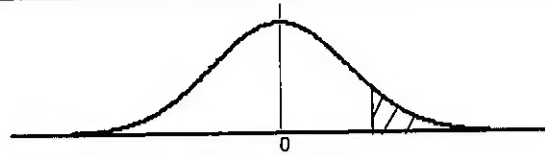
Hijau Bestari Berhad, is a timber company in Sarawak. The company's mill processes 10,000 logs annually, operating 250 days in a year. The timber mill has determined that the ordering cost is RM1,600 per order, the cost of carrying logs in inventory before they are processed is RM15 per log on an annual basis and it takes 4 days to receive the order from the supplier. Determine the following:

- a) The economic order quantity [6 marks]
- b) The minimum total annual inventory cost. [6 marks]
- c) The optimal number of orders per year [3 marks]
- d) The average inventory level [3 marks]
- e) The optimal time between orders (in days) [3 marks]
- f) The number of logs that should be on hand when an order is placed [4marks]

[Total 25 Marks]

End of Page

Table 1
The Upper Tail Area Under the
Standard Normal Curve



Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641
0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681
1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
2.6	0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
2.9	0.0019	0.0018	0.0018	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
3.0	0.0013	0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010
3.1	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007
3.2	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005
3.3	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003
3.4	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002
3.5	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
3.6	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
3.7	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
3.8	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
3.9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000